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Optimisation of spacing to diameter ratio of openings in to steel beams with web openings

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To make the use of steel beams with openings in the web for construction of industrial buildings, high rise building, has turn out to be extensive in modern times. There are numerous reasons for which openings are kept. Various popular openings shapes are, hexagonal, circular and rectangular. Due to openings in the web, the behaviour of such beam is different than that of plain-webbed beams. The various parameters which influence the behaviour of such special type of beams are shape of openings, size of openings, spacing of openings, aspect ratio, various numbers of openings and reinforcement (stiffeners). Therefore, this paper presents the detailed experimental and finite element investigation on optimisation of spacing to diameter ratio of steel beams with web openings. Five models have been tested having different spacing to diameter ratio of openings for direct comparison. Spacing to diameter ratio of openings in the range of 1.33-1.6 found to very effective.

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Strength analysis of concrete (300/20) with super plasticizer

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Admixtures are used in concrete to obtain some specific properties to enhance the performance of concrete. In this research, concrete of a specific grade (300/20) with a super plasticizer (Ha Be) has been selected to enhance the reliability on the use of admixture in concreting. In the introduction part of the research, properties of super plasticizer are discussed while later the technical data of Ha Be and result of different test on concrete are discussed. Initially materials/ingredients of concrete (300/20) are specified and correction for moisture have been made for 1 cm. A total of six design batches are selected to prepare a total of 36 cube of standard size (150 mm x 150 mm x 150 mm). To know the workability, the slump have been conducted at six stages i.e. initial, at 30 minutes, 45 minutes, 60 minutes, 75 minutes and at 90 minutes. The study shows that the concrete with the use of this specific super plasticizer (Ha Be) get the desired workability (slump value 150+25 mm) at 60 minutes, and it is concluded that such super plasticizers are recommended where transportation of concrete required 60 minutes. Since concrete gain a significant strength at seven days and remaining strength is gained at 28th day, therefore 18 cubes have been crushed at an age of 7 days, while remaining 18 have been crushed at an age of 28 days. These strength especially the 28th day strength (average value=53 Mpa) has been compared with the required one (46 Mpa) and was found satisfactory. The densities of all the 36 cubes were also computed at two stages to compare it with the required density (2400 kg/m³). Both the calculated densities at 7 days for 18 cubes and at 28 days for 18 cubes was compared and found satisfactory. At the end, it is concluded that if any super plasticizer is required to get some specific properties, it can be used confidently since it is not affected on the strength at all. Although the research is only focusing on the strength up to 28 days, it is also required to study the behavior of concrete at later stages to see if there is any adverse effect in concrete due to the use of super plasticizer.

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